IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

David Pasquier et al. Examiner: Elena Tsoy Lightfoot

Serial No.: 10/516,610 Group Art Unit: 1792

Filed: May 25, 2005 Confirmation No.: 7124

Title: THERMAL INSULATION METHOD, PROCESS FOR PREPARING AN INSULATING GEL, AND INSULATING GEL OBTAINED

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
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Sir:

Further to the Notice of Appeal filed on November 15, 2010, please consider the following.

The Appeal Brief fee of $ 540.00 is filed/paid herewith. The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

(i) REAL PARTY IN INTEREST

The present application is owned by IFP Energies Nouvelles, successor to Institut Francis Du Petrole, the assignee of the present application by means of an assignment recorded at Reel 016694, Frame 0642 on May 25, 2005.

(ii) RELATED APPEALS AND INTERFERENCES

There are no known related appeals or interferences.

(iii) STATUS OF CLAIMS

Pending: Claims 1, 2, 4-14, 16-37 and 39-43.

Withdrawn: Claims 7, 11, 20, 30-37 and 39-41.

Rejected, Appealed: Claims 1, 2, 4-6, 8-10, 12-14, 16-19, 21-29, 42 and 43.

(iv) STATUS OF AMENDMENTS

There were no amendments to the claims subsequent to Final Rejection. The amendment providing a new Abstract to the Specification was entered.

(v) SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to, in claim 1, a method for thermal insulation, comprising:

- positioning a gel formed from an insulating liquid base, which is a phase change material, at least one gelling agent comprising at least one polysiloxane resin, which may or may not be modified, and a compatibilizing agent between said insulating liquid base and said polysiloxane on a surface of an object to be insulated and
- in situ cross-linking of said polysiloxane resin,

wherein the compatibilizing agent is a molecule with the same nature as the insulating liquid base that can be grafted onto the polysiloxanes during cross-linking; and wherein the gelling agent represents 0.5% to 50% and the insulating liquid base represents 50% to 99.5% of the total weight of the mixture. See the present specification at page 4, lines 11-16, page 7, lines 13-14 and 19-22 and 10-12.

The invention is also directed to, in claim 24, a method for insulating a flowline or a pipeline or a singularity on a flowline or pipeline, comprising

- positioning a gel formed from an insulating liquid base, which is a phase change material, and at least one gelling agent comprising at least one polysiloxane resin, which may or may not be modified, and a compatibilizing agent between said insulating liquid base and said polysiloxane on a surface of the flowline or pipeline to

be insulated and

in situ cross-linking of said polysiloxane resin. See the specification at page 4, lines 11-16, page 7, lines 13-14 and 19-22 and 10-12.

(vi) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The rejection of Claims 1, 2, 4, 5, 8, 10, 12-14, 17-19, 21, 22, 24-26, 28, 29, 42 and 43 under 35 USC§103(a) as being unpatentable over Pause (US 7,488,773) in view of Kilgour et al. (US 6,262,170).

The rejection of Claims 6, 9, 15, and 16 under 35 USC§103(a) as being unpatentable over Pause '773 in view of Kilgour et al, '170, and further in view of Salyer (US 5,053,446).

The rejection of Claim 22 under 35 USC §103(a) as being unpatentable over Pause '773 in view of Kilgour et al. '170, further in view of Hupfield (US 7,019,098).

The rejection of Claims 22-23 under 35 USC §103(a) as being unpatentable over Pause '773 in view of Kilgour et al. '170, further in view of Craubner (US 4,348,243).

The rejection of Claims 24-29 under 35 USC §103(a) as being unpatentable over Pause '773 in view of Kilgour et al. '170, as applied above, further in view of Vergouw (US 4,941,773).

(vii) ARGUMENT

Rejection over Pause taken with Kilgour:

Claims 1, 2, 4, 5, 8, 10, 12-14, 17-19, 21, 22, 24-26, 28, 29, 42 and 43 remain rejected under 35 USC §103 over Pause taken with Kilgour. Pause discloses silicone rubber materials containing finely divided phase change materials, and a process for their production. See column 1, lines 18-21. Pause discloses a method for thermal insulation of cables or thermal protection of technical products employing this silicone rubber matrix containing the finely divided phase change materials, emulsified or dispersed in a cross-linked silicone rubber structure. Pause fails to teach the use of a compatibilizing agent. Instead, a silicon rubber matrix is formed by mixing a phase change material in a liquid silicon rubber having a cross-linking agent (e.g., a hydrogen-functional polysiloxane) and a catalyst. Pause does not teach the need for a compatibilizing agent, inasmuch as the *crystalline* alkyl hydrocarbon phase

change materials employed therein are taught to be stable, do not flow out of the silicon rubber structure in liquid stage and are first melted. See columns 3 and 4 of the patent. It is respectfully submitted that Kilgour is directed to a nonanalagous art area. Kilgour discloses a silicone elastomer gel emulsion/composition usable in the cosmetic field (see column 1, lines 59-61 and column 7, lines 65 to column 8, line 10 and examples 9 (make-up) and 13-14 (anti-perspirant). The silicon elastomer of Kilgour is better dispersed in the organic liquid used in the emulsion or the composition (see column 1, lines 52-53). The organic liquid is defined in column 7, lines 15-24, as specifically suitable for a cosmetic emulsion/composition, and is used at ambient temperature. One of ordinary skill in the art would not have combined this disclosure in Kilgour directed to cosmetics to an insulating agent such as liquid silicon rubber as described in Pause, wherein it is necessary to reduce the risk of demixing between an insulating base and polysiloxane so as to obtain thermal insulation having improved insulating quality, and stability over time and a *wide temperature range*. Regardless of whether it is well known to use a compatiblizing agent to homogenize a mixture of components in a personal care composition, the entirely different constraints found in insulating cables or bicycle seats as in Pause (with, in the case of cables, an amount of composition which surely would satisfy the personal care requirements of a small village) is simply not common sense to one of ordinary skill in the art. In view of the lack of any indication in the widely different fields of Pause for the need of a compatibilizer, this combination of references simply is hindsight.

However, it is argued at page 5 of the Final Rejection that the properties of a chemical compound depend on the structure thereof, not on the intended use. Indeed, this is true as to the properties of the compound. However, that is not the issue here, where the rejection depends on whether one of ordinary skill in the art would take a material shown to provide an important function in cosmetic compositions, and decide to add that material to a composition employed in insulation, when there is, first, no showing that the added material is needed for the reason it is employed in the secondary reference and, two, no expectation in the art that the property of the material in cosmetic range would be maintained in the wholly different environment of the primary reference. At page 5, the Final Rejection argues that, if this logic were true, a reference in the beverage art teaching that ethanol mixes with water for beverages would not be expanded to the use of ethanol to mix with water in a cosmetic

composition. Indeed, such an expansion would not be obvious. The fact that a water/alcohol mixture may be pleasant to drink does not provide one of ordinary skill in the art with a reasonable expectation of success if a water-based cosmetic composition is diluted with alcohol, and then applied to the skin. Would the fact that the material mixes result in a composition which maintains pleasant drinkability? A cosmetic composition is not to be ingested. Could the composition be applied to the skin without irritation? We do not know. The point is, the fact that a combination may be advantageous in one environment, does not make that combination advantageous in all environments, particularly different environments, with different factors at play. Thus, the use of a compatibilzer in cosmetic composition does not suggest to one of ordinary skill in the art that beneficial properties would be obtained by the use of that compatibilzer in an insulating composition.

In insulating compositions, stability of the gel is an important property of the insulator, and in the present claims is achieved by incorporating a compatibilizing agent which is of the same nature as the insulating liquid base and can be grafted onto the polysiloxanes during cross-linking. See, for example, page 12, line 25 – page 13, line 1 of the present specification: when the insulating liquid base essentially consists of a paraffin or a mixture of paraffins (for example a C_{14} to C_{20} paraffin cut), a compatibilizing agent is generally used to improve the stability of the gel and to avoid paraffin washout. Indeed, in the insulating realm, the amount of the various components in the formulation is of importance, as taught at page 12, lines 3-6 of the specification: the fact that the hydrosilane functions consumed by grafting the compatibilizing agent can no longer take part in cross-linking and node formation is taken into account. The formulation is adapted to provide sufficient hydrosilane functions to ensure grafting of the compatibilizing agent and cross-linking.

Thus, it is clear that one of ordinary skill in the art would not combine the compatibilizer of the cosmetic composition of Kilgour with the insulating compositions of Pause, with any reasonable expectation of success in the environment of the primary reference.

At page 6, the Advisory Action mischaracterizes Appellants' argument as "if a beverage reference teaches ethanol and water mix well for beverages, one of ordinary skill in the art should not expect ethanol to mix well with water if the mixture is used in a cosmetic composition." This is not what Appellants are arguing. Appellants' argument is that, while the ethanol and water

may mix well, there is no indication that the mix would be suitable for use in a different environment. For example, even if the material mixes well, would it feel too wet on the skin, or would the alcohol dry the skin too much in a cosmetic formulation? It is not possible to generalize the teachings from the secondary reference, which simply do not relate to the stresses and conditions found in insulating a pipe. On this basis alone, it is submitted that the rejection should be overturned.

Claims 24-29:

It is submitted that claims 24-29 are further patentable, in addition to the reasons discussed above. Claims 24-29 remain rejected under 35 U.S.C. 103 over Pause taken with Kilgour and Vergouw. Reconsideration of this rejection is also respectfully requested. As noted above, Pause, even in combination with Kilgour fails to disclose the use of a compatibilizing agent in combination with a insulating composition such as that of the claims. Vergouw does not describe an insulating liquid base which is a phase change material, gelling agent with at least one polysiloxane resin and a compatibilizing agent, but instead discloses a gel based on kerosene having increased viscosity when stirred. As a result, regardless of its teaching of the insulation of power cables, this reference even in combination fails to suggest insulation of a pipeline with a combination of ingredients as claimed. Indeed, insulation of power cables may include electric and thermal insulation, and must be achieved by using both protection by a pipeline (for safety) and thermal insulation by the insulation composition. At page 4 of the Final Rejection, it is apparently argued that the preamble recitation of insulating a flowline or pipeline is not given patentable weight. In fact, the pipeline is not just a preamble recitation, as in the body of claim 24 there is further recitation that the insulating liquid base and gelling agent are positioned "on a surface of the flow line or pipeline to be insulated," thus requiring the presence of the flowline or pipeline.

However, it is argued at page 5 of the Final Rejection that the Pause disclosure of "thermal insulation of cables or thermal protection against *technical products*" (emphasis added), at col. 3, lines 26-28, does not limit the scope of "technical products" and thus reads on protecting any products known to need thermal insulation coverage. It is respectfully submitted that this is far from how one of ordinary skill in the art would interpret "technical products." Indeed, if any "technical product" needing insulation were encompassed by this recitation in

Pause, regardless of the entirety of the disclosure and what patentees actually teach, then the material could be used for insulating rocket engines, inside of winter coats, inside of the glass of double pane windows, electronic components, and many other uses despite varying widely diverse factors being imposed upon the thermal insulating material. Clearly, this is *not* only not patentees' intent, but not how the term would be taken by one of ordinary skill in the art. Instead, since "technical products" has no intrinsic meaning, one of ordinary skill would look to the specific class of products disclosed in the reference, and would see that the properties disclosed therein are "thermal performance" and "comfort sensation" (see the abstract) and "thermal performance characteristics and thermal comfort sensation" (see col. 1, lines 26-27). This "thermal comfort" is always associated with the thermal performance of items which are in human contact, i.e., car seats, bicycle saddles, diving suits, building materials or medical devices (see the abstract), sports garments, diving suits, protective garments, blinds, building materials, medical products, automotive products (col. 1, lines 29-31), building products, protective garments, medical devices, automotive products and sporting goods such as diving suits (col. 3, lines 27-30). In all of these products, the common thread is human perception of thermal comfort (even for building materials, as thermal insulation in buildings is an important factor in achieving thermal comfort for the occupants there within). Note also that, although Pause does disclose also "cable insulation," the patent makes a distinction between "cable insulation" and "thermal protection of technical products." This clearly shows that insulation and thermal protection do not address equivalent issues. Thermal protection of technical products thus would be taken by one of ordinary skill in the art to mean overheating of electric or electronic components such as batteries, etc. One of ordinary skill in the art would not, however, envision "technical products" to include pipelines or flowlines, since these utilities are wholly different than the thermal insulation of bicycle seats, or building materials, where human comfort rather than transmissive properties are of importance, and different from insulation of electronic products or cables where the desire is to prevent humans from exposure to heat generated by operation of the device. Simply because a material is effective in these uses does not suggest to one of ordinary skill that the material can be used in the highly different environment of pipelines.

Even regardless of how "technical products" would be interpreted, it its important to realize that insulation of power cables even if they are placed inside of pipelines is not equivalent to insulation of pipelines themselves. In the Abstract, insulating an item A placed inside of

another item B is not technically equivalent to insulating the entirety of this system A + B. Moreover, insulating the entire system A + B with the aim of insulating A, is not equivalent to insulating B, again considering many diverse factors that are imposed upon the thermal insulating material. Vergouw teaches that an electrical cable can be insulated by placing it inside of a pipeline. This does not teach that the insulating composition of Pause could be adapted to insulate pipelines, *per se*. The desirability of insulating pipelines is not disputed. While Appellants disagree with the argument at page 4 of the Office Action that they have failed to mention Vergouws' teaching of pipelines in their response to the Final Rejection, it is again maintained that the simple information in Vergouw that an electric cable can be insulated by placing it into a pipeline does not teach one of ordinary skill in the art to use the insulating composition of Pause with pipelines *per se*. Accordingly, it is submitted that there is ample further basis to overturn the rejection of claims 24-29.

Rejection of Claims 6, 9, 15 and 16 Under 35 USC §103 over Pause, Kilgour and Salyer:

Claims 6, 9, 15 and 16 have been rejected under 35 USC §103 over Pause, Kilgour and Salyer. The deficiencies of Pause and Kilgour are discussed above. Salyer, cited purely for its disclosure of various phase change materials, provides no remedy to this deficiency. In Salyer, patentees' process involves cross-linking of the matrix, then phase change material is subsequently added, and incorporated into the cross-linked matrix by immersing the matrix into a bath of melted phase change material. Not only does Salyer fail to disclose a process in which the phase change material is added in a polysiloxane resin during the cross-linking step, but Salyer fails to disclose the use of a compatibilizing agent in order to improve the stability of the insulating gel over the time.

The Advisory Action, for example at page 7, in conjunction with this rejection and the other rejections employing secondary references including Hupfield and Craubner appears to continue to select the specific portions of the tertiary references desired. However, nothing addresses Appellants contention which is that these references, regardless of how they are combined with the primary and secondary references, fail to remedy the deficiencies of the primary and secondary references as noted throughout.

Accordingly, ample basis to overturn this rejection exists, and is respectfully requested.

Rejection of Claim 22 Under 35 USC §103:

Claim 22 remains rejected under 35 U.S.C. 103 over Pause, Kilgour and Hupfield. Hupfield does nothing to remedy the deficiencies of Pause and Kilgour, discussed above. Hupfield is cited solely for its disclosure of anti-bacterial agents used in insulating materials. In fact, Hupfield does not relate to the field of flow lines or pipeline thermal insulation. Hpfield fails to describe a gel formed from an insulating liquid base which is a change material and at least one gelling agent comprising at least one polysiloxane resin, and Hupfield fails to describe that additives are soluble in the liquid base. Accordingly, ample basis to overturn this rejection also exists.

Rejection of Claims 22 and 23 Under 35 USC §103:

Claims 22 and 23 remain rejected under 35 U.S.C. 103 over Pause, Kilgour and Craubner. Craubner also fails to remedy the deficiencies of Pause and Kilgour and indeed is cited only for its disclosure of biocides. Although Craubner discloses a method for thermally insulating a pipeline consisting of surrounding the pipeline with an insulated material, which material comprises a plurality of contiguous hollow structures whose interstices are filled with a polysiloxane elastomer (line 35-39 page 2), Craubner fails to describe an isolated gel comprising an insulating liquid base which is a phase change material, a gelling agent comprising at least one polysiloxane resin and a compatibilizing agent. Furthermore, Craubner fails to describe that additives are soluble in the liquid base. As a result, Craubner fails to remedy the deficiencies of the primary and secondary references, and withdrawal of this rejection is also respectfully requested.

Reversal of the rejection is therefore mandated by law, and is respectfully and courteously requested.

Respectfully submitted,

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(viii) CLAIMS APPENDIX

1. A method for thermal insulation, comprising:

- positioning a gel formed from an insulating liquid base, which is a phase change material, at least one gelling agent comprising at least one polysiloxane resin, which may or may not be modified, and a compatibilizing agent between said insulating liquid base and said polysiloxane on a surface of an object to be insulated and
- in situ cross-linking of said polysiloxane resin,
- wherein the compatibilizing agent is a molecule with the same nature as the insulating liquid base that can be grafted onto the polysiloxanes during cross-linking; and wherein the gelling agent represents 0.5% to 50% and the insulating liquid base represents 50% to 99.5% of the total weight of the mixture.

2. A method according to claim 1, wherein said insulating liquid base is:

- saturated or unsaturated, cyclic or non-cyclic aliphatic hydrocarbon bases;
- aromatic hydrocarbon bases;
- mixtures of aliphatic and aromatic fractions;
- aliphatic or aromatic alcohols;
- fatty acids, vegetable oils or animal oils; or
- halogenated compounds.

4. A method according to claim 1, wherein said insulating liquid base is a C_{12} to C_{60} paraffinic cut.

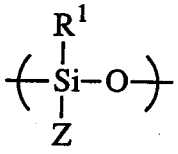
5. A method according to claim 4, wherein said insulating liquid base is long chain C_{30} to C_{40} n-paraffin waxes or long chain C_{30} to C_{40} isoparaffin waxes containing 1 or 2 branches.

6. A method according to claim 1, wherein said insulating liquid base is slightly branched alkyl chain alkylaromatics or alkylcycloalkanes, fatty alcohols or fatty acids.

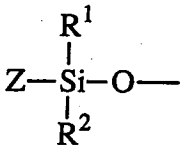
8. A method according to claim 1, wherein said polysiloxane resin is:

- monomers containing a motif with formula (I) terminated by two motifs with formula (II);
- oligomers with unitary motifs with formula (I) terminated by motifs with formula (II);
- polymers comprising unitary motifs with formula (I) terminated by motifs with formula (II);
- cyclic oligomers comprising unitary motifs with formula (I); or
- cyclic polymers comprising unitary motifs with formula (I);

formulae (I) and (II) being shown below:



(I)



(II)

in which formulae:

- symbols R^1 and R^2, which are identical or different, each represent:
    - a linear or branched alkyl radical containing less than 30 carbon atoms, optionally substituted with at least one halogen;
    - a cycloalkyl radical containing 5 to 8 carbon atoms in the cycle, optionally substituted;
    - an aryl radical containing 6 to 12 carbon atoms, which may be substituted; or
    - any other alkylaromatic chain;
- symbols Z, which are identical or different, each represent:
    - a group R^1 and/or R^2;
    - a hydrogen radical;
    - a hydroxyl radical;
    - a vinyl radical ($-CH=CH_2$); or
    - a saturated or unsaturated, aliphatic or cyclic carbonaceous chain, which may or may not contain unsaturated bonds, which may or may not contain heteroatoms, which may or may not contain reactive chemical groups;

with at least one of symbols Z representing a cross-linkable group.

9. A method according to claim 1, wherein said insulating liquid base represents 70% to 99.5% and said gelling agent represents 30% to 0.5% of the total weight of the mixture.

10. A method according to claim 1, wherein the compatiblizing agent between said insulating liquid base and said polysiloxaneis a vinyl compound.

12. A method according to claim 1, wherein the gelling agent comprises two functionalized polysiloxanes:

- a resin A containing vinylsilane functions (Si-CH=CH_2) which may be grafted;
- and a resin B containing hydrosilane functions (Si-H);

and in that cross-linking is carried out by hydrosilylation.

13. A method according to claim 12, wherein the proportions of resins A and B are such that the mole ratio between the hydrosilane groups from resin B and the vinylsilane groups from resin A is 0.8 to 1.4.

14. A method according to claim 12, wherein the mixture comprises a hydrosilylation catalyst.

16. A method according to claim ~~15~~1, wherein said insulating liquid base represents 70% to 98% and said gelling agent represents 2% to 30% of the total mass of the mixture.

17. A method according to claim 12, wherein the compatibilizing agent between said insulating liquid base and said polysiloxaneis octadec-1-ene or allylbenzene.

18. A method according to claim 12, wherein said insulating liquid base is a C_{12} to C_{60} paraffinic cut, the proportion of gelling agent, which includes that of the compatibilizing agent, is 7% to 30% by weight, in which the compatibilizing agent represents a proportion of 10% to 40% by weight.

19. A method according to claim 18, wherein said insulating liquid base is a C_{14} to C_{20} paraffinic cut and the compatibilizing agent is octadec-1-ene.

21. A method according to claim 1, wherein the mixture has a time before gelling regulated by the temperature, the nature and the proportion of resin in said mixture and by the nature and concentration of any catalyst in said mixture.

22. A method according to claim 1, wherein the mixture further comprises at least one additive selected from antioxidant additives, antibacterial agents, corrosion inhibitors, anti-foaming agents and colorants, which are soluble in the insulating liquid base.

23. A method according to claim 1, wherein the mixture further comprises at least one filler which is glass microbeads, fly ash, macrobeads or hollow fibres.

24. A method for insulating a flowline or a pipeline or a singularity on a flowline or pipeline, comprising

- positioning a gel formed from an insulating liquid base, which is a phase change material, and at least one gelling agent comprising at least one polysiloxane resin, which may or may not be modified, and a compatibilizing agent between said insulating liquid base and said polysiloxane on a surface of the flowline or pipeline to be insulated and
- in situ cross-linking of said polysiloxane resin.

25. A method according to claim 24, comprising insulating an ultradeep pipeline for temperatures of 2°C to 200°C.

26. A method according to claim 24, wherein the mixture is applied as a coating to the flowline to be thermally insulated.

27. A method according to claim 24, wherein the mixture is interposed between the flowline and a protective external jacket.

28. A method according to claim 24, wherein said singularity is a bend, a tee, a valve or an automatic connector.

29. A method according to claim 27, wherein the singularity is on a flowline already in place on a seabed; a vacuum is created in said jacket to purge as much water as possible that it may contain; the mixture is injected into the jacket to inflate it and to create the desired insulation around said singularity.

42. A method for thermal insulation, comprising:

- positioning a gel formed from an insulating liquid base, which is a phase change material, and at least one gelling agent comprising at least one polysiloxane resin, which may or may not be modified, on a surface of an object to be insulated and
- in situ cross-linking of said polysiloxane resin,

wherein said insulating liquid base is:

- saturated or unsaturated, cyclic or non-cyclic aliphatic hydrocarbon bases;
- aromatic hydrocarbon bases;

- mixtures of aliphatic and aromatic fractions.

43. A method for insulating a flowline or a pipeline or a singularity thereon, comprising:

- positioning a gel formed from an insulating liquid base, which is a phase change material, and at least one gelling agent comprising at least one polysiloxane resin, which may or may not be modified, on a surface of an object to be insulated and
- in situ cross-linking of said polysiloxane resin wherein said insulating liquid base is:
- saturated or unsaturated, cyclic or non-cyclic aliphatic hydrocarbon bases;
- aromatic hydrocarbon bases;
- mixtures of aliphatic and aromatic fractions.

(ix) EVIDENCE APPENDIX

None

(x) RELATED PROCEEDINGS APPENDIX

None